COMBINED SUPERIOR TIBIOFIBULAR AND ASTRAGALOFIBULAR OSTEOPLASTY AS A MEANS TO PREVENT SHORTENING OF THE LEG AFTER EXTENSIVE OSTEOMYELITIS OF THE TIBIA OCCURRING DURING ADOLESCENCE.[1]

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ACUTE inflammatory lesions of bone under the term of Necrosis, have commanded the most serious attention of the medical profession since the earliest history of medicine, and it was Chassaignac in 1854 who first applied the term "osteomyelitis" to that suppurative affection of bones, which is of so-called idiopathic origin.

It may be interesting to us as Americans to note that this disease was minutely described by Nathan Smith in 1829. The case was that of a colored boy eleven years of age, who was admitted to the Baltimore Infirmary for the treatment of disease of the thigh. To any one who may be interested, a full description of this case is given on page 121 in his "Medical and Surgical Memoirs."

Early diagnosis followed by prompt and thorough evacuation of the infected area by a sufficiently long incision of the soft parts, including the periosteum, combined with free opening of the medullary canal is regarded by the profession the proper procedure to carry out, but it is in the later stages that considerable difference of opinion exists in the minds of progressive surgeons.

Some advise the expectant plan after free drainage is established because they fear that the periosteum may not be able to generate new bone; others depend on this membrane with an abiding faith, and it is quite remarkable to note that those belonging to the former class assign no reason why it does not do so.

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[1] Read before the Chicago Surgical Society, April 6, 1906.

Nichols, with what might be called a wise diplomacy, supported by an extensive knowledge gained from his experimental work, takes a somewhat middle course and advises waiting until the periosteum demonstrates its ability to reproduce new bone by the appearance of osteoblasts on this membrane; then he advises the radical removal of the shaft and epiphysis if necessary, and thorough antiseptic cleansing of the infected parts, after which the periosteum is sutured and the cavity obliterated. His work constitutes a considerable advance in the treatment of this very serious disease, and the time that is usually the most favorable in his opinion for the removal of the shaft is from the eighth to the tenth week after the onset of the disease.

The results obtained by Cushing and others in Boston certainly seem to warrant the assumption that the above procedure is a marked improvement over the older methods of delay.

Reverting to the early treatment, Nichols advises that the endosteum be not disturbed as is so often done by the curetting of the bone-marrow. His conclusions are:

a. Drainage of the soft parts is not sufficient; the bone-marrow is often infected and must be drained.

b. A portion of the cortical bone must be removed by the trephine.

c. Curetting of the bone-marrow should not be done, as it causes extensive destruction of the endosteum.

d. Operate as early as possible.

e. In the subacute stages, remove the necrotic shaft completely or partially at an early stage; for mechanical reasons the manipulation of the periosteum is easier after ossification of the periosteum has begun, but while the membrane is still plastic, and the rapidity and surety of perfect regeneration seem greater at that time.

f. Early performance of an operation and removal as far as possible of all infected areas lead to an earlier success.

Berndt is one of those who never has any fear that the periosteum will not generate new bone, while Küster claims that failure sometimes occurs.

The question of the ability of the periosteum to generate new bone is very important, because in many cases this takes place so rapidly that great shortening of the limb is prevented, particularly in those patients who are nearing the end of the period of adolescence, also in those in whom the epiphyseal line is not destroyed by the disease.

Von Bergman clearly draws attention to the fact that if the disease, in cases in which the tibia is involved, is only of sufficient activity to stimulate the epiphyseal line, lengthening of the bone takes place and a position of valgus occurs; but if the line is destroyed, in whole or only partially, shortening results in a position of inversion of the foot.

There are cases on record, particularly of severe traumatism to the tibia, in which the shortening was so great that the patient had to bear the weight of the body on the outer malleolus in some cases, and in others had to contend with the disability incident to the upward displacement of the fibula on account of this bone occupying a position external to the knee-joint.

A review of the literature on the subject of osteomyelitis, while it brings out many interesting and practical points, fails to inform us what percentage of cases have their origin in the upper and lower ends of the tibia respectively; but it is probable, inasmuch as the lower end of the femur is the area most frequently involved of all the bones, that the upper end of the tibia is attacked oftener than the lower, because the growth in the upper portion is estimated to be about three-fourths of the whole, while the lower is one-fourth.

The experience gained from the following case seems to the writer to warrant the conclusions: That the periosteum can be relied upon to regenerate new bone; that it is not necessary to wait for two or two-and-a-half months for evidences of repair on the part of this membrane, and that it is even better to remove the shaft of the tibia entirely just as soon as one feels satisfied that the vitality of the involved bone is sacrificed;

that on account of the difficulties of rendering the parts sufficiently aseptic, through-and-through drainage either with gauze or tubes should be instituted just preliminary to the suturing of the edges of the periosteum together.

The principal point in this case and the one which the writer believes to be of value in properly selected cases, is the substitution of the fibula for the tibia as the pressure-bearing bone, in order that continued growth in the length of the leg may be maintained.

The time since the operation is entirely too short to prove absolutely whether the fibula will continue to grow in length as fast as its fellow, but the writer believes it will. Another advantage of this line of treatment, properly carried out, is the great saving of time, because as soon as suppuration has ceased the double osteoplasty, described later, can be performed and the patient allowed to walk as soon as he can after being treated for a compound fracture, say six or eight weeks.

The procedure suggested is as follows,—which, however, was not carried out in this case, because only one osteoplasty was done at a sitting, whereas both should have been performed on the same day and much time saved:

First. Remove all the infected bone and suture the edges of the periosteum together, except at the ends, and drain sufficiently; at the same time prevent deformity as much as possible by the use of splint or cast.

Second. After suppuration has ceased, destroy the upper tibiofibular joint and cause anchylosis at this point; also divide the lower end of the fibula on a level with the upper surface of the lower epiphysis if this is not destroyed, or the astragalus if the epiphysis of the tibia has been sacrificed to the disease, and place the end of the fibula on the new location, either the lower epiphysis of the tibia or the astragalus.

The case report is as follows:

Francis D., aged 10. Had scarlet fever and diphtheria several years ago. Father living and in good health. Mother died of tuberculosis two years ago. Present illness: September

26, 1905, he fell and hurt his left leg near the ankle; three days afterward he went to bed, and a physician was called on October 2d, who, about a week later, made several short incisions and evacuated a large amount of pus. On October 21st he was admitted to the Children's Memorial Hospital suffering from great pain in the leg, which was flexed to a right angle with the thigh, and entirely functionless. Denuded bone could be detected to a great extent with a probe. Hot moist antiseptic dressings were ordered, to be changed every eight hours, and on October 24th a free incision was made over the tibia and the shaft found bathed in pus with the periosteum attached in a thin line on the posterior surface only. The entire diaphysis, lower epiphysis, and the upper portion of the astragalus, were removed down as far as the lateral articular surfaces extended.

After thorough irrigation, the space occupied by the removed bone was filled with iodoform gauze and the periosteum sutured over it, the gauze projecting at the upper and lower extremity of the incision.

A plaster-of-paris cast was applied from the upper part of the thigh to and including the foot. In two days the anterior portion of the cast was cut away, but enough was left about the foot, it was thought, to prevent deformity.

The gauze was removed and tubular drainage substituted, after which moist dressings were kept up until November 30th, then dry dressings until December 12th, when the condition of the leg seemed to warrant the safety of further operation without the danger of reinfection.

The foot by this time was markedly inverted and the following procedure carried out: An inverted U-shaped incision was made, commencing in front of the lower end of the fibula, passing up in front of this bone about four inches, then across and down almost to the level of the starting point, but behind the fibula. The flap thus outlined was turned down of all the soft parts over the bone, including a strip of periosteum about one-third of an inch, with the hope that it would form a sort of brace, and add strength to the leg subsequently. An examination of the last skiagraph taken shows that this hope has been partly realized.

The fibula was now divided with a chisel, on a level with the upper surface of the remaining portion of the astragalus, and displaced inward until the foot assumed a marked everted position and the end of the fibula rested on the astragalus.

Before this operation the measurement from the lower edge of the right patella to the tip of the external malleolus was 32 cm., whereas the corresponding measurement on the left leg was 30 cm. The patient was allowed to walk about the middle of January, 1906.

On February 1st the measurement from a board touching both heels to right anterior superior spine of the ilium was 29½ inches, or 75 cm., while the left was 28¾ inches, or 73 cm., and the distance from the top of the left fibula to the top of the tibia was one cm. less than that on the right leg, thus showing already a slight displacement upward of the fibula.

There was also considerable more motion about this joint than the right, consequently it was considered necessary to destroy it and produce fixation at this point in order to prevent further displacement upward.

On February 2d the boy was again anæsthetized and an incision anterior to the joint made; the articular surfaces were chiseled away; a depression was chiseled into the tibia about two cm. anterior to the normal location of the head of the fibula and the head forced into it, where it was held in place by a heavy kangaroo-tendon suture, carried through the head of the tibia and around that of the fibula.

The skiagraphs show the irregularity of the new tibia and its medullary canal, also the formation of a support from the tip of the fibula to the shaft, which has been thrown out by the periosteum, detached for that purpose.